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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,470	05/24/2000	Toshikazu Hamamoto	JG-YY-4971	5385

26418 7590 11/30/2001

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT PAPER NUMBER

1745

DATE MAILED: 11/30/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/577,470

Applicant(s)

HAMAMOTO ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 May 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## **DETAILED ACTION**

### ***Priority***

1. Acknowledgment is made of applicant's claim for foreign priority based on applications filed in Japan on 04/18/2000 and 05/24/1999. It is noted, however, that applicant has not filed a certified copy of the 2000-116327 and 11-143222 applications as required by 35 U.S.C. 119(b).

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Regarding claims 1, 3-4, 15 and 17-18, the terms "those" (claims 1 and 15) and "that" (claims 1, 3-4, 15 and 17-18) render the claim indefinite because it is unclear as to what particular feature the pronouns are intending in the claimed invention.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 1-5, 11-19 and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negoro et al 6156459.

The instant application is directed to a non-aqueous electrolytic solution wherein the alleged inventive concept comprises the specific combination of organic compounds and solvents. Other limitations include the weight percent, the reduction potential, the specific organic compounds and solvents and its volume percent.

Negoro et al disclose a non-aqueous electrolytic solution secondary battery that comprises a negative electrode material, a positive electrode material, and a non-aqueous electrolytic solution containing a lithium salt, wherein the battery contains an organoboron compound (abstract). *The organoboron compound may be contained in the electrolytic solution* (col 24, lines 20-23); when contained therein, the content of the compound is preferably from 0.0001 to 0.1 mol/l, further the content of the compound in the electrolytic solution is preferably from 0.001 to 10 weight %, and more preferably from 0.01 to 5 weight % (col 24, lines 27-34).

It is disclosed that the electrolytic solution is generally composed of a solvent and a supporting electrolyte dissolvable in the solvent (col 24, lines 35-58). Examples of solvents include propylene carbonate, ethylene carbonate, butylene carbonate, dimethyl carbonate, diethyl carbonate and methyl ethyl carbonate, 1,3-propanesultone and the like, which may be used alone or as a mixture of two or more. Preferably are those including cyclic carbonates and/or acyclic carbonates (col 24, lines 35-58). *In particular, the use of mixed solvent of propylene carbonate or ethylene carbonate and/or diethyl carbonate is preferable* (col 25, lines 10-21/ claim 5). The example for preparation of electrolytic solutions shows the use of 65.3 g of diethyl carbonate (chain carbonate) and 22.2 g of ethylene carbonate (cyclic carbonate), which is equivalent to

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approximately 25.4 weight % for ethylene carbonate, and 74.6 weight % for diethyl carbonate. Volumes percent can be then obtained by using each material density at defined conditions. In addition, the reduction potential is an implicit teaching based on the property of each different compound which is taught.

Negoro et al further teach that the negative electrode material is a carbonaceous material including natural graphite or artificial graphite (col 25, lines 40-50). It is also disclosed that, preferably, the average particle size is 0.1 to 60  $\mu\text{m}$  (col 29, lines 42-46). A preferable positive electrode material is a lithium containing transition metal oxide (col 29, lines 59-64).

Negoro et al disclose nonaqueous electrolytic solution according to the foregoing. However, Negoro et al does not explicitly disclose the combination of two organic compounds with two solvents, and the particularity of the graphite material.

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the non-aqueous electrolytic solution having at least two organic compounds as Negoro et al teach that the solvents may be used alone or as *mixture of two or more*. Therefore, by providing a multiple combination of solvents as taught the prior art, at least three solvents (different compounds) would be present in the non-aqueous electrolytic, and one of the three solvents would then become in the second organic compound. Furthermore, the use of these multiple compounds, regardless whether or not they are solvents, is a generally acceptable practice in the art because it provides to the electrolytic solution the dissolvable feature which is required for supporting the compounds, electrolyte and materials therein. In addition, the reduction potential is an implicit teaching based on the property of each different compound which is taught.

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With respect to the graphite material, it would be obvious to recognize that Negoro et al's anode material may possess the specific lattice spacing as Negoro et al's anode material is either natural or artificial graphite, and thus, this material does have a graphite type crystal structure capable of intercalation and deintercalation of lithium. Hence, Negoro et al's negative electrode material is a carbonaceous material that is capable of occluding and releasing lithium.

7. Claims 6 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negoro et al 6156459 as applied to claims 1, 5, 15 and 19 above, and further in view of Yamaura 5989744.

Negoro et al is applied and incorporated herein for the reasons above. In addition, Negoro et al do not disclose the organic compound being vinylene carbonate.

Yamaura discloses that as for the non-aqueous electrolytic solution for constituting the secondary cell it is possible to use a non-aqueous electrolyte dissolved or dispersed in a conventional non-aqueous medium such as vinylene carbonate; and the non-aqueous solvent may be made from a single carbonate or a mixture of more than one carbonates (col 6, line 58 to col 7, line 7).

Thus, it would have been obvious to one skilled in the art at the time the invention was made to use vinylene carbonate as a compound in Negoro et al's non aqueous electrolytic solution as Yamaura teaches that, judging from voltage stability, it is preferable to use chain carbonates as vinylene carbonate. Moreover, the non-aqueous solvent may be made from a single carbonate or a mixture of more than one carbonates. Thus, the use of vinylene carbonate as a

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compound in a non-aqueous electrolytic solution is suitable and chemically compatible with Negoro et al' electrolytic system.

8. Claims 8 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negoro et al 6156459 as applied to claims 1 and 15 above, and further in view of Tamura et al 5342711.

Negoro et al is applied and incorporated herein for the reasons above. In addition, Negoro et al do not disclose the organic compound being a sulfonate.

Tamura et al disclose a battery with a nonaqueous electrolyte comprising a compound selected from the group consisting of lithium trifluoromethanesulfonate among them, which is dissolved in a solvent mixture comprising ethylene carbonate and an ethereal solvent (abstract).

Based on the aforementioned, it would have been obvious to a skilled artisan in the art to use an organic sulfonate compound in the electrolytic solution of Negoro et al as Tamura et al teach that by combining an electrolyte comprising a combination of an electrolyte of an organic sulfonate (lithium trifluoromethanesulfonate), a higher stability with a solvent mixture and a lower viscosity in particular volume ratio is obtained. Additionally, the electrochemical cell exhibits a lower utilization, after the initiation of the discharge and charge cycles. That is, the utilization at a particular point of time of the completion of specific cycles is inferior to the utilization of the prior art's batteries. Further, the Coulombic efficiency shows an improved long life cycling property.

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***Allowable Subject Matter***

9. The following is a statement of reasons for the indication of allowable subject matter: a through search for the prior art failed to reveal or fairly suggest what is instantly claimed, particularly, the specific organic compounds in combination with the non-aqueous electrolytic solution constituents.

10. Claims 7, 9-10, 21, and 23-24 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following disclosures teach the related subject matter: Hamamoto et al 6139991 which discloses an electrolyte solution for a lithium secondary battery comprising an electrolyte and a carbonic ester derivative both dissolved; and Kashio et al 5776637 teaching the use of particular solvents with a polymeric based binder and an electrode forming composition.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

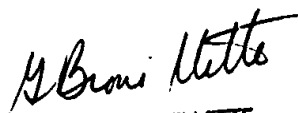
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gabrielle Brouillette can be reached on (703) 308-0756. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.



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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro  
Examiner  
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SUPERVISORY PATENT EXAMINER  
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